
To: Robert Wolfe
From: Harry Montgomery and Nianzeng Che
Subject: Comments on the Geolocation ATBD
Refer number: MCN97-08.LET
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References :

1. MODIS Level 1B Algorithm Theoretical Basis Document 1996, May 1997
2. Level 1B Software Requirements Document, March 1996
3. MODIS Level 1A Earth Location: Algorithm Theoretical Basis Document Version 3.0, April 25, 1997
4. The Spectro-Radiometric Calibration Assembly (SRCA) of MODIS (radiometric, spectral, and spatial calibrations), MCST Reference Number MCM-SSATBD-01-U-R0C0, April 25, 1997

1. Geolocation Products in support of Level 1B Products

Reference 1 presents the algorithms for producing the Level 1B calibration product and reference 2 gives the specific software requirements for the Level 1B product. Reference 2 dictates that the geolocation ATBD include as products the solar vector in solar diffuser coordinates and the lunar vector in EOS spacecraft coordinates both during normal operations and during any spacecraft maneuvers in a timely manner. We would like to see this spelled out explicitly in your ATBD.

2. Page 2-1: Why choose an "ideal " band 0; why not use actual bands?

3. Ground location could be computed independently for all four focal planes and then compared with the prelaunch and SRCA determined differences. This should be considered as part of the reference 3 validation approach.

4. References 3 (page 3-3) and 4 (page 60-61) utilize the same focal plane coordinate system; the x-axis is along-scan and the y-axis points opposite to the track direction. The x value in our current output is expressed as the value of Frame of Data (FD), which is counted as zero from the leading edge of band 30. The Y value is measured from the bottom edge of channel 1. These are different from reference 4 which measures x and y from the optical center. It does not matter because the SRCA algorithm provides the detector shift along-scan and the band centroid shift along-track. There is no ambiguity in directly utilizing the two data sets. The rotation angle of the focal plane about the z-axis is different for the two documents: in reference 3 clockwise is positive, but in reference 4 counter-wise is positive. In the X-Y coordinate system, the use of counter-clockwise as positive rotation seems rational. In line 2 of section 3.1.3.1 on page 3-8, we suggest you change 0.129 to -0.129. In Figure 3-7 on page 3-9, we suggest you change 0.129 to -0.129. These two changes will cause the angles to be consistent with the rotation $\boldsymbol{T}_{\text{sc/oc}}$ defined on page 3-8.

5. The standard output of the L1B data for the SRCA spatial calibration is the channel position shift along-scan and band centroid position shift along-track. The SRCA does not give absolute position. Although it is not a Level 1B product, we also provide the translational shift and rotation each Focal Plane Assembly (FPA). This includes the FPA

shift along-scan, shift along-track, and rotation. Because the FPA plane will translate and rotate like a rigid body the latter information should be more accurate. Another advantage is that if the focal plane information is used the problem of the dead or saturated channels/bands can be avoided.

6. The uncertainty analysis is given on page 3-44. The values are provided for two sigma uncertainty. In comparison with the data we had from an earlier estimate (SDST provided geolocation of 10 nominal 1-km IFOVs in a single band with a location uncertainty (3σ): 97m along-scan, 75m along-track (at launch) and 51m along-scan, 28 along-track (after A & E)), the current estimate seems larger. Do these two data sets have the same meaning or different? How about the uncertainty for the smaller detectors (250m and 500m)?

7. Table 3-3 on page 3-15 should be changed for 13L (from 6 to 5) and 14L (from -2 to -3). Bands 13 and 14 are time delay integration (TDI) bands which were designed for detecting low signals when MODIS is viewing the ocean. In order to meet specifications for maximum SNR, each band contains two physical detector arrays electronically phased so that the sampling area on the earth coincides on any scan. The signals from 13 and 13' (or 14 and 14') are summed electronically. The channel noise is effectively reduced by the summation. Bands 13 and 14 are logically equivalent to four bands, 13L, 13H, 14L, and 14H. The two channels 13L and 13H provide the same measurement at the location of detector 13, except 13L is for measuring bright scenes and 13H is for measuring dark scenes. The two channels 14L and 14H function in a similar way